REMARKS

Claims 1 to 12, 14 and 15 remain in the present application. No claims have been amended by this response.

Reconsideration of the Examiner's decisions and reexamination of this application are respectfully requested. Entry of this Amendment After Final is respectfully requested as there are no amendments of the claims, thereby not necessitating the consideration of any new issues or a new search by the Examiner.

The §103 rejections:

I. Claims 1, 4, 5 and 6 have been rejected by the Examiner under 35 USC §103(a) as being unpatentable over Erk U.S. Patent 5,340,437 in view of Datta et al. U.S. Patent 5,462,638.

The present invention as embodied in claim 1 is directed to the improved uniformity of etching of a film having a plurality of solder bumps. Applicants have found that this film etches slower at the kerf area of a semiconductor wafer where there are usually no C4 solder structures.(Applicants' specification page 3, lines 21-23 and page 4, line 1). Accordingly, in order to solve this problem first discovered by Applicants,

Applicants have proposed rotating the wafer to improve the uniformity of etching. The combination of references proposed by the Examiner do not suggest the problem found by Applicants nor its solution.

As Applicants said in their last response, the Erk reference is distinguishable on at least three counts. The first is that Erk is directed to the etching of bare silicon wafers to remove any residual effects of sawing and lapping. It is to be assumed that as a result of the etching process in Erk, such residual effects would be removed. There is nothing in Erk to indicate that the teachings of Erk would be applicable to any other process other than the removal of such residual effects.

Second, Applicants' claim 1 is directed to a "method of improving the uniformity of etching of a film having a plurality of solder bumps" [emphasis added]. Improving the uniformity of etching is an important limitation of Applicants' claim 1. While Erk appears to address thickness variations, both locally and across the entire wafer (col. 2, lines 22-29), this is not the same as uniformly etching a film across the entire wafer as taught by Applicants.

Third, the teaching of Applicants' invention is that the presence of the solder bumps complicates the etching of the metal films (Applicants' specification page 3, lines 20-21). It cannot be assumed that the etching of a bare wafer as taught by Erk would be applicable to the etching of a wafer with a film having a plurality of solder

bumps. Thus, there is no teaching in Erk to indicate that Erk would be applicable to improving the uniformity of etching of a film having a plurality of solder bumps as claimed by Applicants.

The deficiencies of Erk are not supplied by Datta et al. Datta et al. merely teaches, as recognized by the Examiner, that for a semiconductor wafer having solder bumps, a metallic film (i.e., TiW) may be etched by "dip etching, which allows economical production with a simple throughput cassette-type etching process." (col. 7, lines 45-46). There is nothing in Datta et al. to suggest the problem found by Applicants of nonuniform etching. Nor is there anything in Datta et al. to suggest a method of etching by any other method than dip etching in a cassette-type etching process.

The Examiner states, however, that it would be obvious "...to modify ERK by immersing an article having a plurality of solder bumps as taught by Datta in a tank of etchant for the purpose of allowing economical production with simple throughput cassette-type etching process". It is not understood how the Examiner can jump from the Datta et al. dip etching process where the wafers are in a cassette to a process, as claimed by Applicants, where the wafer is rotated to improve the uniformity of etching. In fact, the Examiner seems to modify Erk by the cassette-type dip etching of Datta. Cassette-type dip etching is not what Applicants are claiming!

The Examiner concludes that "Since Erk in view of Datta use the same steps

and film layer as those of the claimed invention, then combining Erk and Datta would inherently result in a method of improving the uniformity of etching of a film on an article as in the present invention." [emphasis added]. It is submitted that the Examiner's reasoning is flawed in that the foregoing reasoning is applicable to an anticipation rejection based on a single reference but is not applicable to an obviousness rejection based on multiple references. Moreover, if modified as suggested by the Examiner above, there would be a different process than that claimed by Applicants.

Given this flawed reasoning, it is submitted that the Examiner has yet to state a cogent motivation for combining Erk and Datta et al. so as to render obvious Applicants' claim 1.

In view of the preceding remarks, it is submitted that the Examiner has failed to state a prima facie case of obviousness with respect to claim 1. Accordingly, claim 1 should be allowable.

Inasmuch as claims 4 to 6 depend from claim 1, and claim 1 is believed to be allowable, then claims 4 to 6 should be allowable as well.

II. Claims 2 and 3 have been rejected by the Examiner under 35 USC §103(a) as being unpatentable over Erk in view of Datta et al. and further in view of Takeshi et al. (English Abstract of JP 9115977 A2). Claim 7 has been rejected by the Examiner under 35 USC §103(a) as being unpatentable over Erk in view of Datta et al. and further in view of Barbee et al. U.S. Patent 5,445,705.

Inasmuch as claims 2, 3 and 7 depend from claim 1, and claim 1 is believed to be allowable, then claims 2, 3 and 7 should be allowable as well. No independent ground of patentability is asserted for claims 2, 3 and 7 at this time.

III. Claims 8, 11, 12 and 14 have been rejected by the Examiner under 35 USC §103(a) as being unpatentable over Erk in view of Barbee (?).

While the Examiner has recited Barbee as the secondary reference, it is clear that the Examiner meant to recite Datta et al. as the secondary reference in view of the Examiner's rationale for the rejection of claims 8, 11, 12 and 14.

Therefore, the reasoning recited by Applicants for the allowability of claim 1 is equally applicable here for the allowability of claim 8. That reasoning recited earlier is incorporated by reference herein. Accordingly, claim 8 should be allowable.

Inasmuch as claims 11, 12 and 14 depend from claim 8, and claim 8 is believed to be allowable, then claims 11, 12 and 14 should be allowable as well.

IV. Claims 9 and 10 have been rejected by the Examiner under 35 USC §103(a) as being unpatentable over Erk in view of Datta et al. and further in view of Takeshi et al. (English Abstract of JP 9115977 A2). Claim 15 has been rejected by the Examiner under 35 USC §103(a) as being unpatentable over Erk in view of Datta et al. and further in view of Barbee et al. U.S. Patent 5,445,705.

Inasmuch as claims 9, 10 and 15 depend from claim 8, and claim 8 is believed to be allowable, then claims 9, 10 and 15 should be allowable as well. No independent ground of patentability is asserted for claims 9, 10 and 15 at this time.

Summary:

In view of all of the preceding remarks, claims 1 to 12, 14 and 15 are believed to be in condition for allowance. If the Examiner finds this application deficient in any respect, the Examiner is invited to telephone the undersigned at the Examiner's earliest possible convenience to resolve such deficiency.

Respectfully submitted,
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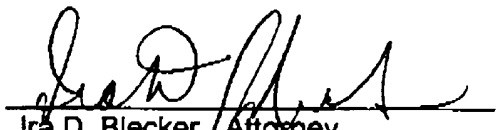
By: 

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